

## A revision of *Mesogona* Boisduval (Lepidoptera: Noctuidae) for North America with descriptions of two new species

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**Abstract.** The North American species of *Mesogona* Boisduval are revised. *Pseudoglaea* Grote, 1876a is treated as a synonym of *Mesogona*. Three species of *Mesogona* occur in North America, two of which are described as new. All are found in western North America: *M. olivata* (Harvey, 1874) occurs from British Columbia south to California and Texas, while *M. subcuprea* n. sp. and *M. rubra* n. sp. are restricted to Washington, Oregon, and California. The adults and genitalia of these species are described and illustrated. A key for identification of the adults is presented. The larva of *M. rubra* is illustrated.

### INTRODUCTION

Members of *Mesogona* Boisduval, 1840 are stout-bodied medium-sized moths. They occur in a variety of habitats ranging from wet forest to semi-arid steppe. The adults are active in the Fall at about the time leaves of deciduous trees and shrubs turn color. Their eggs are laid in the Fall and hatch in the Spring. The known larval foodplants include a diverse assortment of woody plants.

There are five species in this genus, two in Eurasia and three in North America. Until now, only one of the North American species, *olivata* Harvey, 1874, was described. It was placed in the monotypic genus *Pseudoglaea* Grote, 1876b. The two other North American species were recognized recently from material collected in Washington and Oregon. The relationship of the Nearctic species to *Mesogona*, previously thought to be restricted to Europe, became evident because one of the undescribed species resembles *M. acetosellae* (Denis & Schiffermuller 1775), the genotype of *Mesogona*. Closer comparison of the Palearctic *M. acetosellae* to the Nearctic species shows that they are structurally similar and thus congeneric. This revision is limited to the North American *Mesogona* species because the Palearctic species are well known (Fibiger 1993).

### *Mesogona* Boisduval

*Mesogona* Boisduval, 1840:144.

Type species: *Noctua acetosellae* [Denis & Schiffermuller], 1775, by subsequent designation by Blanchard, 1840:512.

*Pseudoglaea* Grote, 1876b:18, **new synonymy**

Type species: *Choephora blanda* Grote, 1876a, by subsequent designation by Grote, 1895:95.

**Description. Adult:** Eyes naked, lashed. Palpi upturned with porrect third segment, the first and second segments bearing long loose scales, the third segment closely scaled. Frons smooth. Antennae ciliate. Thorax untufted, covered with hairlike scales. Prothoracic tibia unarmed, slightly longer than first tarsal segment; meso- and metathoracic tibiae with several loose rows of stout setae ("spines") in addition to the tibial spurs. Tarsal segments with stout setae laterally. Male abdomen with basal coremata in all known species. **Male genitalia** (Figs. 11–14): Uncus narrow, curved. Tegumen broad, with penicillus lobes. Juxta flat, widest ventrally. Valve long and narrow, slightly constricted mesially; cucullus rounded, with a weak corona; sacculus with a costal process (sensu Forbes 1954),  $\frac{2}{3}$ –1  $\times$  as wide as valve, extending to base of harpe; harpe nearly cylindrical, 1.5–2  $\times$  as long as valve width, parallel to valve at base, curved posterodorsad distally; digitus absent. Aedeagus with dorsal and ventral extensions onto base of vesica; vesica 1–2.75  $\times$  as long as aedeagus, coiled or T-shaped and bent, surface minutely granulate and armed with two to three fields of cornuti, portion of vesica bearing cornuti either flat, slightly raised, or a small diverticulum; the cornuti are fragile and entire cornuti or fragments are often left in the female corpus bursae following copulation. **Female genitalia** (Figs. 15–18): Bursa copulatrix uni- or bisaccate; corpus bursae curved toward right anteriorly, with 1–3 signa, posterior corpus bursae (*M. acetosellae*) or appendix bursae heavily sclerotized; appendix bursae (if present) broadly joined to corpus bursae posteriorly, extending to the right and anteriorly; ductus seminalis joined to posterior corpus bursae (*M. acetosellae*) or to apex of appendix bursae. Ductus bursae  $\frac{2}{3}$ –1  $\times$  as long as bursa, joined to it posterodorsally; ostium bursae weakly sclerotized. Anterior apophyses  $\frac{1}{2}$ – $\frac{2}{3}$  as long as posterior apophyses. Ovipositor lobes triangular, covered with long and short hairlike setae.

**Discussion:** McDunnough (1927, 1928) recognized the close relationship of *M. olivata* and *M. acetosellae*, but retained *Pseudoglaea* because of differences in the lengths of the distal spines of the first tarsal segments of the first legs ("tarsal claws") of these species. The link between the Old and New World species is more evident now since *M. acetosellae* (Fig. 9) is similar to the recently discovered *M. subcuprea* n. sp. (Fig. 6), and both of these species lack the long "tarsal claws" of *M. olivata*.

The most closely related genus is *Eucirroedia* Grote, 1875 from the eastern United States and southern Canada. This monotypic genus (type species *pampina* Guenée, 1852) differs from *Mesogona* by the following character states: 1) the vestiture of thorax has a median crest, absent in *Mesogona*; 2) the mid and hind tibiae bear only two weak spines while those of *Mesogona* have multiple stronger spines; 3) the forewing is falcate and scalloped while that of *Mesogona* has a slightly convex crenulate outer margin; 4) the harpe of the male valve is expanded and flattened subapically and pointed dis-

tally while that of *Mesogona* is uniform in width; 5) the juxta has a membranous dorsomedian cleft, absent in *Mesogona*; 6) the bursa copulatrix is long and narrow while that of *Mesogona* is ovoid or bisaccate.

The species of *Mesogona* have often been placed in Noctuidae, as defined by Hampson, due to the presence of tibial spines (Hampson 1903, McDunnough 1928, Fibiger 1993). They are more closely related to a group of genera referred to as the “winter moths” (Xylenini, in part), including *Eucirroedia*, *Metaxaglaea* Franclemont, and *Epiglaea* Grote. *Mesogona olivata* is correctly placed in Xylenini by Franclemont and Todd (1983). In this list Xylenini is placed in the Cucullinae (as defined by Hampson). Hampson’s subfamily concepts are now recognized to be unnatural. Recent reevaluation of the subfamilies in the trifold noctuids, outlined in Poole (1994), indicates that *Mesogona* is a member of the subfamily Noctuidae which has been expanded to include a large number of species previously included in other subfamilies.

The distribution of the species of *Mesogona* is disjunct. The Palaearctic species occur predominantly in Europe with the range of *M. acetosellae* extending east to the Altai Region of Siberia (Fibiger 1993), while the Nearctic species are restricted to western North America. In Europe, larval foodplant records include *Quercus* species for *M. acetosellae* and *Salix* species for *M. oxalina* (Hübner, [1803]) (Fibiger 1993).

#### Key to adults of North American species of *Mesogona*

- 1.a. Hindwing gray or with gray suffusion; vesica of aedeagus with two distal bands of short thin cornuti (Fig. 11b); appendix bursae overlapping corpus bursae ventrally (Fig. 15); widely distributed in western North America ..... *olivata*
- 1.b. Hindwing uniform copper-colored or reddish, without gray scales; vesica with stout cornuti; appendix bursae not overlapping corpus bursae ventrally; restricted to the west coast states ..... 2
- 2.a. Thorax and forewings yellow-brown, with orbicular and reniform spots strongly outlined; vesica shaped like a lopsided T with median and subapical cornuti (Fig. 12b); appendix bursae not overlapping corpus bursae (Fig. 16) ..... *subcuprea*
- 2.b. Thorax and forewings brownish red to pink, with faint or absent forewing spots; vesica coiled with one stout basal cornutus and two subapical bands of long cornuti (Fig. 13b); appendix bursae overlapping corpus bursae dorsally (Fig. 17) ..... *rubra*

#### *Mesogona olivata* (Harvey), new combination

(Figs. 1–5, 11, 15; Map 1)

*Glaea olivata* Harvey, 1874:120, TL — California. Grote 1880:155, Smith 1893:221, Dyar 1903:181.

*Choephora blanda* Grote, 1876a:86, TL — Washington Territory and Vancouver Island, [British Columbia].



- Pseudoglaea blanda* (Grote) Grote, 1876b:18, Smith 1893:210, Dyar 1903:178, Anderson 1904:29, McDunnough 1927:65, Jones 1951:52, Franclemont & Todd 1983:145.
- Pseudoglaea taedata* Grote, 1876b:18, TL — Texas. Smith 1893:210, Dyar 1903:178, McDunnough 1927:65, Jones 1951:52, Franclemont & Todd 1983:145.
- Cerastis olivata* (Harvey) Grote, 1878:181.
- Pseudoglaea decepta* Grote, 1881:271, TL — Colorado. Smith 1893:210, Dyar 1903:178, Jones 1951:52, Franclemont & Todd 1983:145.
- Metalepsis blanda* (Grote) Dyar, 1903:132.
- Metalepsis taedata* (Grote) Dyar, 1903:132.
- Metalepsis decepta* (Grote) Dyar, 1903:132.
- Mythimna blanda* (Grote) Hampson, 1903:608, pl. 76, fig. 19; Barnes & McDunnough 1917:47.
- Mythimna taedata* (Grote) Hampson, 1903:608; Barnes & McDunnough 1917:47.
- Mythimna decepta* (Grote) Hampson, 1903:608; Barnes & McDunnough 1917:47.
- Spectraglaea olivata* (Harvey) Hampson, 1906:439, pl. 106, fig. 14.
- Mesogona olivata* (Harvey) Barnes & McDunnough, 1916:161.
- Mythimna olivata* (Harvey) Barnes & McDunnough, 1917:47, Blackmore 1927:19.
- Pseudoglaea olivata* (Harvey) McDunnough, 1927:65, McDunnough 1938:67, Jones 1951:52, Franclemont & Todd 1983:145.

**Description. Adults** (Figs. 1–5): Males and females identical in habitus. Distal spines of first tarsal segment of prothoracic leg twice as long as proximal spines. Ground color of head, dorsal antennae, thorax, and forewings variable, ranging from dull tan to reddish brown, gray-brown, or cream; median area of forewing and postmedian space at costa darker; palpi with mixture of ground color and dark scales; abdomen fuscous. Forewing length: 15–20 mm. Forewing  $2\times$  as long as wide; margin crenulate; lines double, smooth, pale filled; basal line sinuous, evident only near costa; antemedian line oblique, undulating, bent basad at costa, outer line dark; median shade absent; postmedian line smooth, laterally convex, inner portion dark, strongest in interspaces; subterminal line sinuous, indistinct, a series of dark spots between veins; terminal line thin and dark; orbicular and reniform spots large, pale with darker filling; claviform spot absent. Hindwing variable, fuscous gray to reddish, always suffused with gray scales, with darker terminal area and faint discal spot, fringe lighter. **Male genitalia** (Fig. 11): Valves as in generic description; costal lobe of sacculus triangular. Vesica  $2.75\times$  as long as aedeagus, shaped like a lopsided T beyond basal twist with short extension ventrad and to the right and longer distal portion curved dorsad and to the left, two long fields of fine cornuti on distal  $\frac{1}{3}$ , the proximal end of the field of larger cornuti is raised from adjacent vesica surface. **Female Genitalia** (Fig. 15): Corpus bursae approximately  $2\times$  as long as wide, ante-





Map 1. Map of part of western North America showing distribution of examined material of *M. olivata*.

rior  $\frac{1}{2}$  curved dorsad and to the right, with single long dorsal and ventral signa; appendix bursae cone-shaped, curving anteriorly to overlap ventral corpus bursae. Anterior  $\frac{2}{3}$  of ventral ductus bursae with a sclerotized band.

**Type Specimens:** *Choephora blanda* Grote was described from two syntypes. One specimen was located, a male in the BM(NH) labeled: Vancouver I, Grote Coll 82-54 / 4425 Vancouver Island / *Choephora blanda* Type. Grote / *Pseudoglaea blanda* Grote / Syntype / Noctuidae Brit. Mus. slide No. 4925 male. It lacks antennae as is mentioned in the description. This specimen is here designated lectotype. The holotypes of *Glaea olivata* Harvey, *Pseudoglaea taedata* Grote, and *Pseudoglaea decepta* Grote are also in the BM(NH). Photographs of these type specimens and their genitalia have been examined.

**Diagnosis:** This species is variable in color and size. The range of color is depicted in the illustrated specimens. Individuals from semi-desert locales

tend to be pale while those from more mesic forest are darker. Most specimens are brownish (Figs. 1–3), but reddish morphs (Figs. 4, 5) also occur and can be common. *M. olivata* is most easily separated from both other species by the presence of gray scales on its hindwings, but can also be determined without dissection by the presence of long distal spines on the first segment of the prothoracic tarsi. These are nearly equal in length to the proximal spines in the other species. Both this species and *M. rubra* n. sp. differ from *M. subcuprea* n. sp. in having the distal cornuti of the vesica in two bands. These are thin in *M. olivata* and stout in *M. rubra*. Also, the latter species has a coiled vesica while that of *M. olivata* is somewhat T-shaped. The female genitalia of *M. olivata* differ from the other species in that the anterior portion of the appendix bursae overlaps the ventral corpus bursae.

**Early stages:** The larva has been described by Crumb (1956). It is a general feeder on deciduous shrubs and trees. Crumb lists poplar, oak, hazel, *Amelanchier* Medic., alder, antelope brush, *Symphoricarpos* Duhamel, and *Berberis* L. as foodplants. It has also been reared from *Quercus garryana* Dougl. and *Ceanothus velutinus* Dougl. in Oregon (J.C. Miller, pers. comm.) and *Quercus agrifolia* Nee. in California (J. Powell, pers. comm.).

**Distribution and flight period:** This common species occurs from southern coastal and interior British Columbia south through California, Colorado, and Texas (Map 1). It most likely also occurs in northern Mexico. The distribution records suggest that it is most common in the western portion of its range. It occurs most often in dry open forest but also lives in shrub steppe and mesic forest habitats. *M. olivata* is sympatric with both other species. Adults have been collected from late August to November, with the earliest flight in the northern part of its range.

*Mesogona subcuprea* Crabo & Hammond, **new species**  
(Figs. 6, 12, 16; Map 2)

**Description. Adults** (Fig. 6): Males and females identical in habitus. Spines of first tarsal segment of prothoracic leg nearly equal. Head, palpi, dorsal antennae, thorax, and ground color of wings light yellow brown; proximal antennae and terminal space of forewing slightly lighter; abdomen reddish. Forewing length: 19–21 mm. Forewing broader than in *M. olivata*, outer margin prominently crenulate; lines and spots similar to *M. olivata*; orbicular and reniform prominent with filling darker than ground color. Hindwing light copper-colored, slightly glossy, with faint median shade and discal dot. **Male genitalia** (Fig. 12): Valves as in generic description; costal lobe broad, nearly obsolete. Vesica 2× as long as aedeagus, shaped like a lopsided T beyond basal twist with short extension dorsad and toward right and longer distal portion curved ventrad, cornuti divided into a patch of equal length spines on a median diverticulum and a large subapical patch with multiple minute and several massive rod-like spines. **Female genitalia** (Fig. 16): Corpus bursae 2.5× as long as wide, anterior  $\frac{1}{3}$  bent 90° to the right, with 1

long dorsal and 1 short ventral signa; appendix bursae dorsoventrally flattened and heavily sclerotized with irregular ridges, extending first posteriorly and to the right and then anteriorly to project to right of median corpus bursae without overlap; ductus seminalis joins right anterior appendix bursae. Anterior  $\frac{1}{2}$  of ventral ductus bursae with broad sclerotized band.

**Type specimens:** Holotype, ♂: WASHINGTON: Kittitas Co.: Reecer Cr. at Johnson Cyn., 900 m, 47.16°N 120.62°W, 4.IX.1989, Lars Crabo. Paratypes, 32♂, 22♀: WASHINGTON: Same data as type locality: 17.IX.1988 (2♂), 4.IX.1989 (4♂, 5♀), 1.IX.1990 (1♀), 4.IX.1994, Troubridge & Crabo (8♂, 11♀); Klickitat Co.: Lyle, 4 mi [6.4 km] N., 1500' [457 m], 12.VIII.1960, D.F. Hardwick (6♂, 2♀); Toppenish, 29 mi [46.7 km] S., 1800' [549 m], 23.VIII.1960, D.F. Hardwick (10♂, 3♀); Yakima Co.: Tieton River valley, Oak Creek at Tieton River, Elev. 525 m, 46.72°N 120.81°W, 7.IX.1990, L.G. Crabo, riparian with Garry Oak (1♂); Kushi Canyon, 17.IX.1949, E.C. Johnston (1♂).

We restrict the type series to specimens from Washington state. The holotype is in the Canadian National Collection (CNC). Paratypes are in, or will be deposited in, the CNC, the United States National Museum (USNM), University of California (Berkeley), University of California (Davis), Oregon State University (Corvallis), and the personal collections of Lars Crabo (Bellingham, Washington) and Jim Troubridge (Langley, British Columbia).

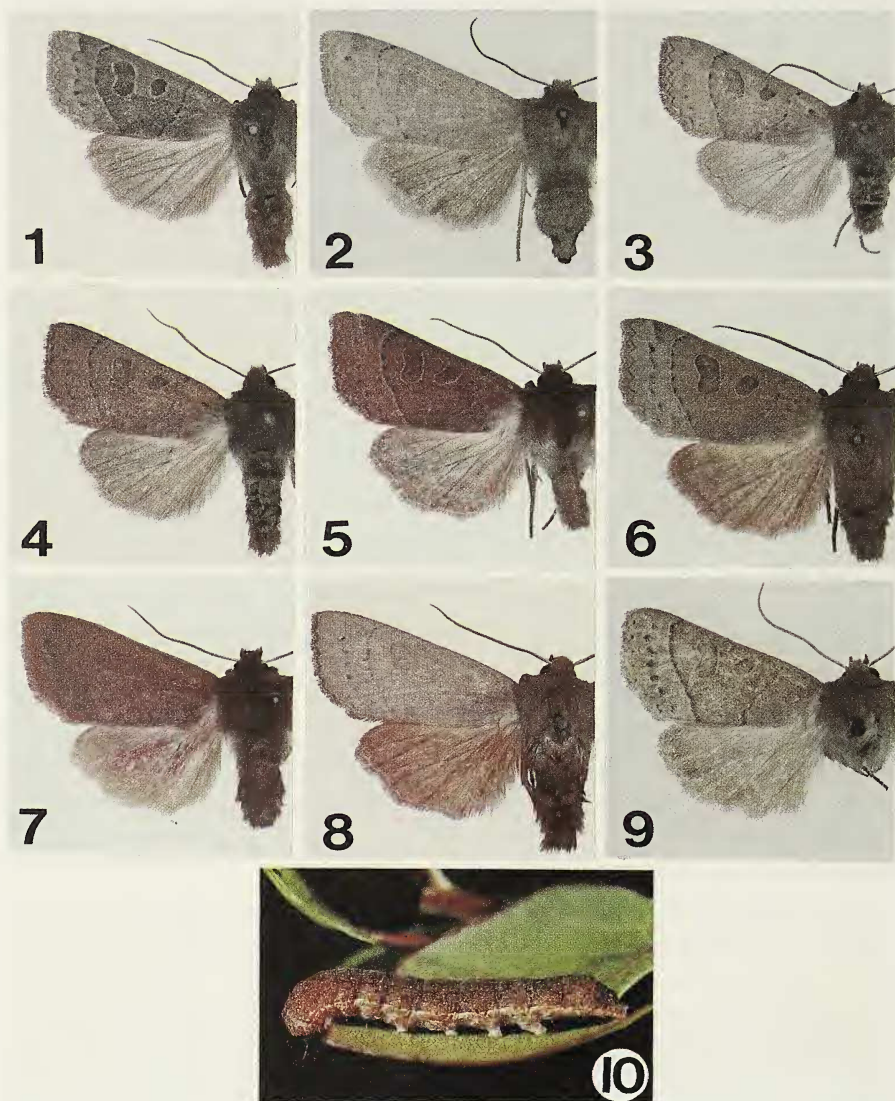
**Diagnosis:** This species is less variable than *M. olivata* or *M. rubra*. It can be identified by the combination of yellow-brown ground color and light copper-colored hindwings. It is the only North American species with a median patch of spines on the male vesica and no overlap of the appendix bursae and corpus bursae of the female genitalia.

*M. subcuprea* superficially resembles *M. acetosellae* (Fig. 9) which occurs in Eurasia. The male genitalia of *M. acetosellae* (Fig. 14a) differ from those of the North American species by having a more massive valve with a large rounded costal lobe of the sacculus. Its vesica (Fig. 14b) is most like that of *M. subcuprea*. Both species have a median patch of cornuti on a diverticulum, while the other species have two distal patches and no diverticula. Furthermore, both *M. acetosellae* and *M. subcuprea* have at least one massive spine in the subapical group. The female genitalia of *M. acetosellae* (Fig. 18) differ from all of the North American species by having a unisaccate bursae copulatrix.

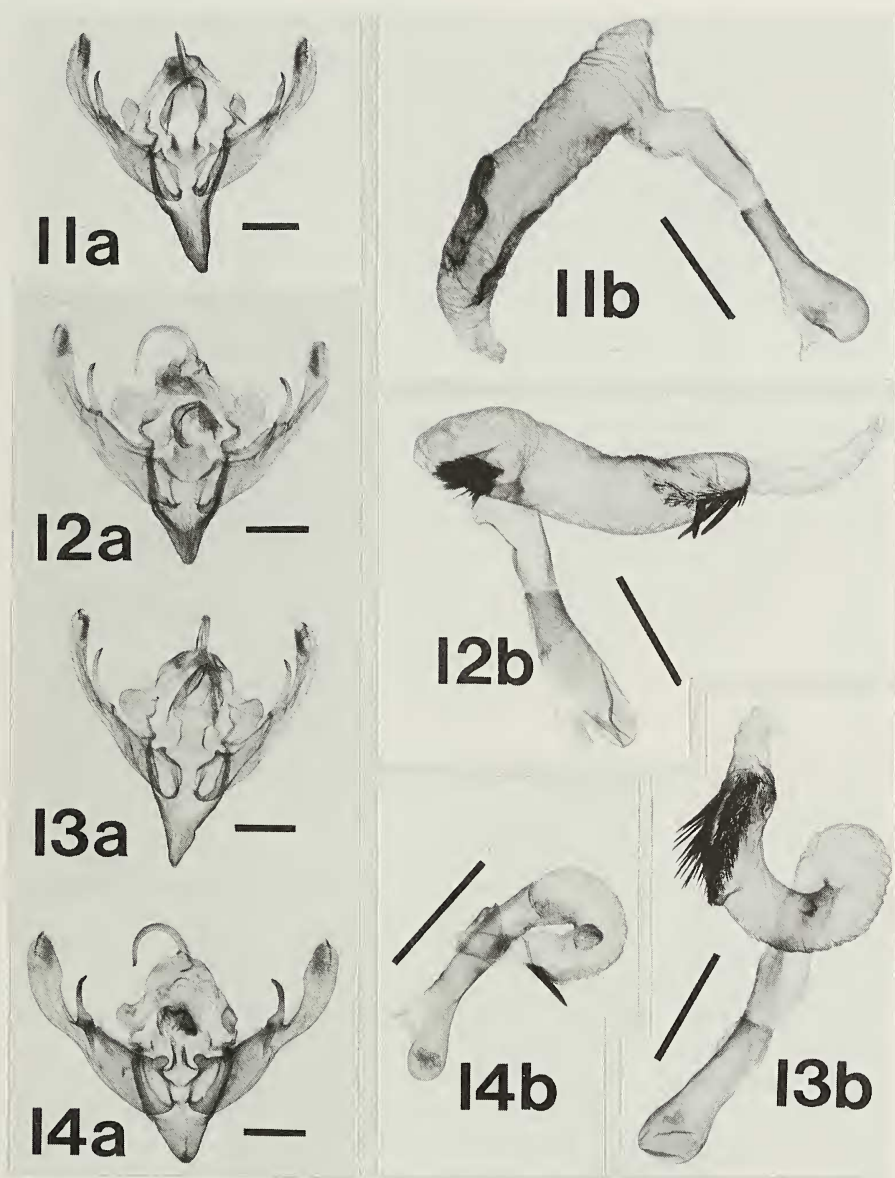
**Early stages:** The larva of *M. subcuprea* has been reared on *Quercus agrifolia* at Big Creek, Monterey County, California (J. Powell, unpub. data) and *Q. dumosa* Nutt. from the San Gabriel Mountains, Los Angeles County, California (label data, L. Crabo collection), but has not been described. It is closely associated with oak at many localities, but must also feed on other genera since oaks are absent from the type locality.

**Distribution and flight period:** *M. subcuprea* is known from the east slope of the Cascade Mountains and the eastern Columbia Gorge in Washington, from the Willamette Valley and the Klamath Mountains in Oregon,

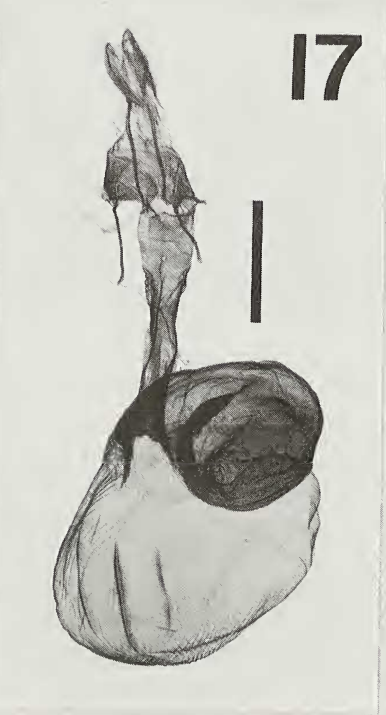
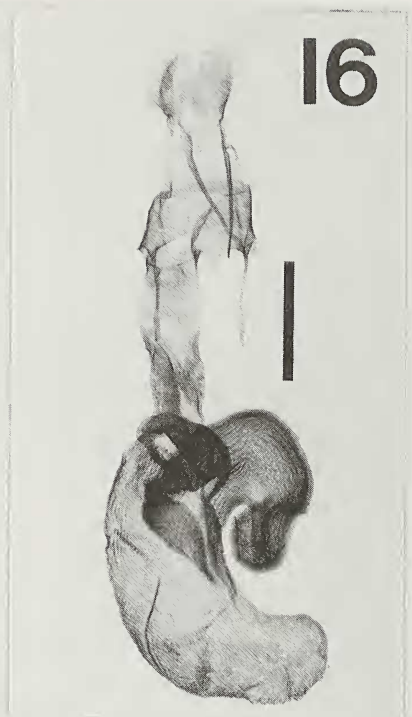
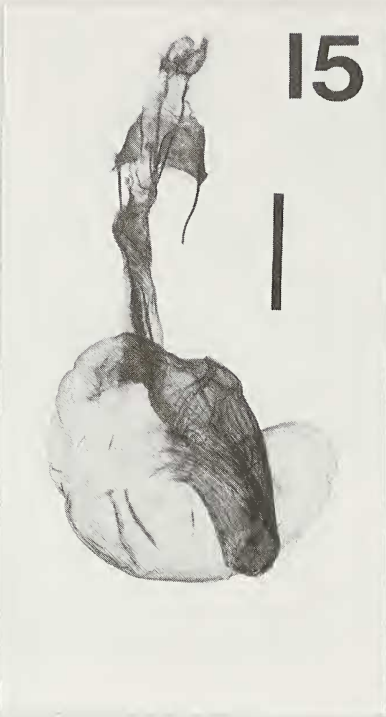




Figs. 1-10. Adults and larvae of *Mesogona*. 1) *M. olivata* ♂, British Columbia, Okanogan Falls, near Vaseaux Lk. 2) *M. olivata* ♀, California, Mono Co., Benton Insp. Sta. 3) *M. olivata*, male, Washington, Grant Co., 1.5 mi [2.4 km] N. of Wanapum Dam on Hwy. 243, 225 m. 4) *M. olivata* ♂, Oregon, Douglas Co., Umpqua River valley, Thorn Prairie, 1040 m. 5) *M. olivata* ♂, Washington, Skagit Co., Anacortes, S. slope of Sugarloaf, 900' [274 m]. 6) *M. subcuprea* ♂, paratype, Washington, Kittitas Co., Reecer Creek at Johnson Canyon, 900 m. 7) *M. rubra* ♂, paratype, Washington, Skamania Co., Big Lava Bed, 3000' [914 m]. 8) *M. rubra* ♂, California, B.T.I. Exp. For., Grass Valley. 9) *M. acetosellae* ♂, Digne, Gallia mer. 10) Last instar larva of *M. rubra*, Oregon, Josephine Co., Cave Junction.



Figs. 11-14. Male genitalia of *Mesogona* species. Vesica of aedeagus has been everted (bar = 1 mm for genital capsule; 2 mm for aedeagus). 11) Male genitalia of *M. olivata*, Oregon, Douglas Co., Umpqua River valley, Thorn Prairie, 1040 m (a = valves; b = vesica). 12) Male genitalia of *M. subcuprea*, Washington, Kittitas Co., Reecer Creek at Johnson Canyon, 900 m (a = valves; b = vesica). 13) Male genitalia of *M. rubra*, paratype, Washington, Cowlitz Co., N. shore Lewis River between Yale Lake and Swift Creek Reservoir, 580' [177 m] (a = valves; b = vesica). 14) Male genitalia of *M. acetosellae*, Digne, Gallia mer. (a = valves; b = vesica).





and from the Klamath Mountains, the Sierra Nevada, and Coast Ranges south to Los Angeles in California (Map 2). Adults have been collected from mid August until early October. It emerges approximately one week earlier than *M. olivata* at the type locality. Adults come to light, but are more attracted to sugar bait at some localities.

**Comments:** Grote's original description of *Choephora blanda*, including "forewings... yellowish fawn..." and "hindwings silky reddish... with a trace of median line" could pertain to either *M. subcuprea* or some specimens of *M. olivata*. This hindwing description is especially suggestive of *M. subcuprea* although some specimens of *M. olivata* have reddish hindwings with gray scales. The Vancouver Island syntype of *blanda*, designated lectotype above, is a typical *M. olivata* with fuscous hindwings and two subapical bands of cornuti on the vesica. The other syntype from Washington Territory could not be located in collections containing Grote type specimens (J.D. Lafontaine, pers. comm.) and is presumed lost. It is likely that the lost syntype was also a *M. olivata* despite the suggestive description since the Vancouver Island specimen and *M. subcuprea* are dissimilar and would probably have been recognized as different species by Grote.

*M. subcuprea* is moderately common in collections, especially in material from California, but has been confused with the more common *M. olivata*.

The name *subcuprea* refers to the copper color of the hindwings of this attractive species.

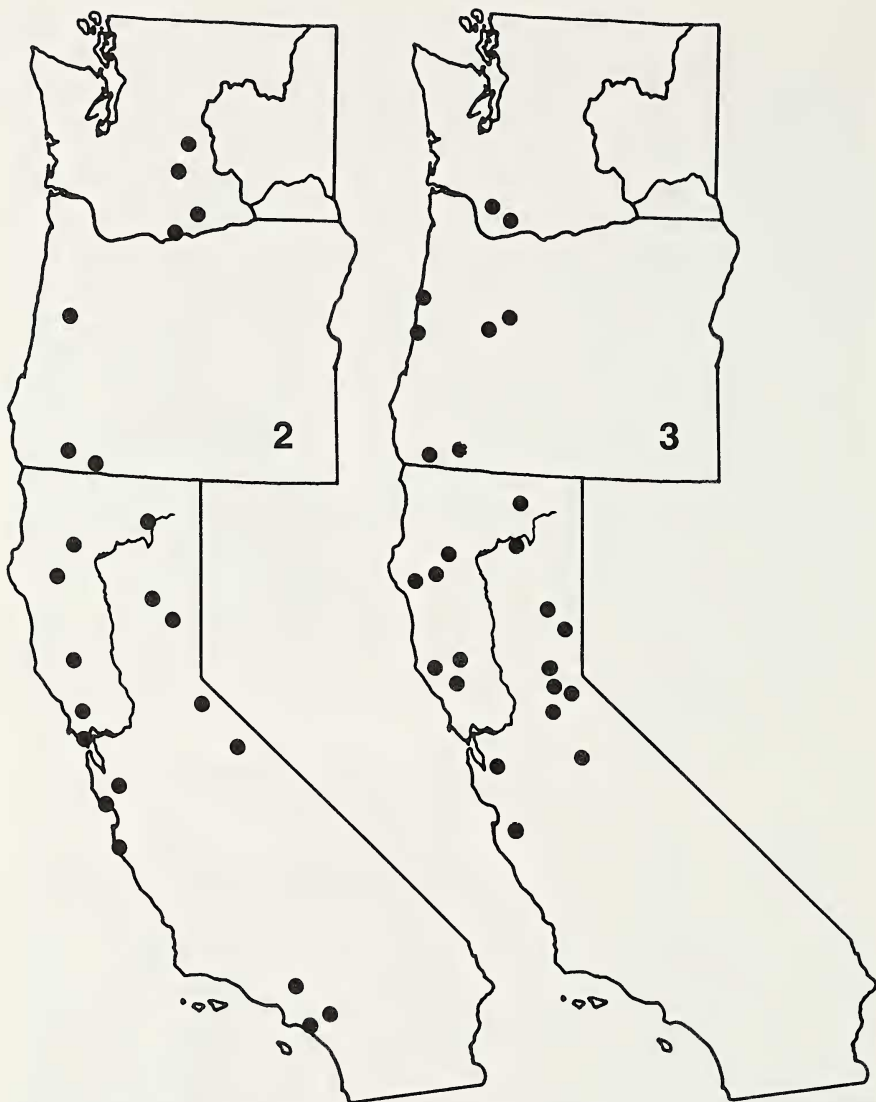
*Mesogona rubra* Hammond & Crabo, **new species**

(Figs. 7, 8, 10, 13, 17; Map 3)

**Description. Adults** (Fig3. 7, 8): Males and females identical in habitus. Spines of first tarsal segment of prothoracic leg nearly equal. Ground color of head, palpi, dorsal antennae, thorax, abdomen, and forewings uniform brownish red, appearing nearly immaculate. Forewing length: 18–21 mm. Forewing 2 × as wide as long; margin undulating; lines double, inconspicuous, evident mostly as the pale filling; basal line and median shade obsolete; antemedian line oblique, undulating, bent slightly basad at costa; post-median line forming a laterally convex arc, its inner line absent or evident as small dark dots in interspaces opposite cell; subterminal line sinuous, a series of faint dark dots between veins; terminal line dark, barely evident; orbicular and reniform spots faint, pale, similar in shape to those of *M.*

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Figs. 15–18. Female genitalia of *Mesogona* species (bar = 2 mm). 15) Female genitalia of *M. olivata*, Washington, Kittitas Co., Reecer Creek at Johnson Canyon, 900 m. 16) Female genitalia of *M. subcuprea*, paratype, Washington, Kittitas Co., Reecer Creek at Johnson Canyon, 900 m. 17) Female genitalia of *M. rubra*, California, Diablo, 3 mi [4.8 km] NE, 2100' [640 m]. 18) Female genitalia of *M. acetosellae*, PODOLE POLUDN., str, KOP u Bedrykowce, Koroszków.



Map 2. Map of Pacific Coast states showing distribution of examined material of *M. subcuprea*.

Map 3. Map of Pacific Coast states showing distribution of examined material of *M. rubra*.

*olivata* but filled with ground color. Hindwing immaculate, uniform red with a slight sheen, terminal area and fringe lighter in some specimens.

**Male genitalia** (Fig. 13): Valves as in generic description; costal lobe small and rounded. Vesica  $2.5\times$  as long as aedeagus, coiled  $360^\circ$ , first ventrad and toward right and then leftward to project to left of distal aedeagus, with a small flattened basal cornutus, distal  $\frac{1}{3}$  with two large fields of cornuti containing both minute hairs and long spines, the latter as two longitudinal bands one with longer spines than the other, the proximal portion of the

band of shorter spines elevated from surrounding vesica like the end of an anvil. **Female genitalia** (Fig. 17): Corpus bursae rounded, slightly wider than long with blunt extension posteriorly to the right, with 1 long dorsal and 2 long ventral signa; appendix bursae bulbous, slightly rugose, extending anteriorly and dorsally to overlap right side of dorsal corpus bursae; ductus seminalis joined to left anterior appendix bursae. Anterior  $\frac{2}{3}$  of ventral ductus bursae with a thin sclerotized band.

**Type specimens:** Holotype, ♂: OREGON: Linn-Lane Co. [Lane County]: H. J. Andrews For., 11 mi [17.7 km] NE. Blue River, September 3, 1986 / J.C. Miller LEPSTUDY, HJA Admin. site, 1500' [457 m] elev., ex. UV light trap / 1. Paratypes, 26♂, 5♀: OREGON: Lane Co.: Florence, 10.IX.1960, Blk. Lt. Trap, K. Goeden (2♀), 1.IX.1995, J. Troubridge (10♂); 0.2 mi [0.3 km] E. of S. Fk. McKenzie R. on Rd. to Cougar Reservoir, 44.15°N 122.25°W, 350 m, 14. IX .1991, L.G. Crabo, powerline cut/manzanita (1♂); Lincoln Co.: Newport, 15.IX.1961, Blk. Lt. Trap, K. Goeden (1♂); Linn Co.: Santiam Pass, Hwy. 20, 16.IX.1993 / 3-1-A (1♂), 29.IX.1993 / 3-1-B (1♂), 9.IX.1993 / 3-1-B (1♂), 22.IX.1993 / 3-1-B (1♂), 10.IX.1993 / 3-1-B (1♂), 15.IX.1993 / 3-1-B (1♂); Linn-Lane Co. [Lane Co.]: same as type locality, September 2, 1986 (1♂), September 11, 1986 (1♂), September 1, 1987 (1♂); Linn-Lane Co.: H.J. Andrews, [larva collected] 8.IV.1986, reared (1♀), [larva collected] 8.IV.1986, ex. *Arctostaphylos columbiana*, 86-49 (1♀), [larva collected] 8.IV.1986, ex. *Arctostaphylos columbiana*, 86-50 (1♀); WASHINGTON: Cowlitz Co.: N. shore Lewis R. between Yale L. and Swift Creek Res., 46.05°N 122.25°W, 580' [177 m], 30.VIII.1994, A. & L. Crabo, small lava bed/manzanita (2♂); S. Cascades, Dry Cr. 300 m E. of FR81, 1 mi [1.6 km] N. of Merrill L., 46.11°N 122.32°W, 1620' [494 m.], 30.VIII.1994, leg L.G. Crabo, pumice with lodgepole pine (2♂); Skamania Co.: E. side of Big Lava Bed on FR66, 2 mi [3.2 km] S. of South Prairie, 45.89° N, 121.72° W, 3000' [914 m], 29.VIII.1994, A. & L. Crabo, Lava flow, Lodgepole pine (1♂).

We restrict the type series to specimens from Lane County, Oregon and north in Oregon and Washington. The holotype will be deposited in the CNC. Paratypes are in, or will be deposited in, Oregon State University (Corvallis), USNM, University of California (Davis), and the personal collections of Lars Crabo (Bellingham, Washington) and Jim Troubridge (Langley, British Columbia).

**Diagnosis:** Most individuals of this species are easily recognizable by the combination of red forewings and immaculate red hindwings. Populations of *M. rubra* from Lane County, Oregon northward are uniformly of the deep red to brownish red color morphs. The populations in California and southwestern Oregon are quite variable, with pink morphs (Fig. 8) common along with the red morphs. These vary from pale whitish pink to a darker pinkish gray. Some of the light-colored individuals resemble *M. subcuprea*, but lack the well-defined orbicular and reniform spots on the forewing of this species. Some red *M. olivata* morphs are also similar to *M. rubra*, but have gray hindwings and more distinct forewing markings. *M. rubra* is the only North



American species with a coiled male vesica and dorsal overlap of the appendix bursa with the corpus bursae in the female.

**Early Stages:** The larva of *M. rubra* (Fig. 10) is reddish brown in ground color with a finely mottled pattern, and has a pale lateral stripe. This coloration blends with the reddish bark of *Arctostaphylos*. By contrast, the larva of *M. olivata* reared from *Ceanothus velutinus* is pale whitish gray in ground color with fine black lines and dots, and has a broad white lateral stripe (J.C. Miller, pers. comm.). Larvae of *M. rubra* have been beaten from and reared to adults exclusively on *Arctostaphylos columbiana* Piper in Lane County, Oregon and an *Arctostaphylos* species, possibly *A. cinerea* Howell, in Josephine County, Oregon (J.C. Miller, pers. comm.). The larvae have been collected during April and May. It probably utilizes *A. nevadensis* Gray in Washington sites where *A. columbiana* does not occur. However, it is probably host restricted to certain species of *Arctostaphylos*, since it has never been collected along the east slope of the Oregon Cascades in habitat with *A. patula* Greene.

**Distribution and flight period:** This species occurs in the Cascade Mountains north to Skamania County, Washington, in the Klamath Mountains, on the Pacific coast from central Oregon to central California, and in the Sierra Nevada (Map 3). It is sympatric with both other species at many localities, including with *M. olivata* at the type locality. *M. rubra* occurs in dry forests with *Arctostaphylos* species, including lava flows in the Washington and Oregon Cascades and forested dunes on the Oregon coast. It flies from late August to mid October.

The red color of this species resembles the bark of the foodplant. This feature is shared by some of the other Noctuid moths which feed on *Arctostaphylos* and madrone (*Arbutus menziesii* Pursh. — both Ericaceae) which both have reddish brown bark. These include *Orthosia mys* (Dyar), *O. pulchella* (Harvey), and *O. transparens* (Grote). This is likely a protective adaptation, although it is not known that the moths rest on the plants during the day.

**Comments:** This species is moderately common in California collections but has been confused with *M. olivata*. It was first recognized as distinct from *M. olivata* during a Lepidoptera survey of the H.J. Andrews Experimental Forest (USDA) performed by Jeffrey C. Miller of Oregon State University.

The specific epithet refers to the prominent red color of this species.

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